MALware Technical Report
Timothy Leary's *Mind Mirror*

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Abstract

Research concerning the cultural, historical, and technical significance of software and computer-related artifacts presents several unique methodological challenges. This technical report uses *Timothy Leary's Mind Mirror* (Electronic Arts, 1985/1986) as a case study in ways that new users may begin to identify physical, textual, and bibliographic features unique to a given software artifact. Specific features investigated relate to the many computing environments, hardware/software configurations, copying techniques, and supplementary documentation comprising *Mind Mirror* today. The methods used to investigate these features are presented not only as approaches to analyzing *Mind Mirror*, but also as ways to approach historical software in general. These methods include software execution across a variety of platforms, as well as textual analysis of supporting documents and electronic file analysis using hex editors.

About the Author

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Introduction

Timothy Leary's *Mind Mirror* (Electronic Arts 1985/1986) is a primarily text-based interactive software work produced in partnership between celebrity psychologist Timothy Leary and publisher Electronic Arts, programmed by Bob Dietz and Peter Van den Beemt. According to representatives from Leary's Futique Trust, the program sold about 65,000 copies during its initial market lifespan, making it a moderate commercial success.[1] Today, copies of *Mind Mirror* are preserved in numerous cultural and scholarly institutions, perhaps owed to Leary's professional associations with well-known computer-culture figures such as MIT Media Lab director Joi Ito and Electronic Frontier Foundation co-founder John Perry Barlow.[2] Unfortunately, preservation does not necessarily imply accessibility or documentation. Many copies of *Mind Mirror* have been separated from their original instructions, computing environments, and physical formats. This technical report will provide a basic overview of the cultural, historical, and technical background knowledge needed to execute and understand *Mind Mirror* today, alleviating some of the confusion that first-time users of this idiosyncratic title may face. In the process, the report will also discuss several basic techniques for evaluation and analysis of historical software titles, outlining a set of basic practices that can help users to identify meaningful physical, computational, and cultural attributes not only in *Mind Mirror* but in many other historical software titles as well.

Background and notable features

Mind Mirror is often understood as a game, but the program also confounds traditional genre distinctions in a number of significant ways. It is based on Leary's theories of psychological classification and interpersonal communication, developed throughout his 40-year long career as both academic psychologist and new age philosopher. While promoting the project, Leary tended towards using the language of psychological self-help, rather than computer gaming. In marketing notes, Leary pitched the title as a potential "monster best-seller in the education field", as the "first product to open up the life simulations market", and suggested that it would primarily compete with software such as the word processor WordStar and spreadsheet program Lotus 1-2-3.[3] In Electronic Arts' actual promotional writing, however, *Mind Mirror* is generally called a game.

When *Mind Mirror* is booted up, users typically begin by answering a series of questions about personality traits, after which their psychological profiles may be displayed on a set of charts derived from Leary's 1950 PhD dissertation on personality classification. Afterwards, users navigate a series of branching paths through written text, role-playing as themselves or someone else. At this stage, users may choose to play through a series of different narrative episodes, including meetings with a Hollywood agent and the first day at a new school. Both the personality charting and narrative role-playing segments of *Mind Mirror* describe themselves using strange terms like "Mind Scoping" and "Thought Modification", making the program difficult to navigate for users unfamiliar with Leary's broader oeuvre and idiosyncratic writing

style. Below, this report will discuss techniques for analyzing Leary's writing in *Mind Mirror* both in terms of its relation with earlier psychological theories, and the relationships between subtly varied editions of the work.

Variety of editions

Mind Mirror was initially released in at least three different editions, but subtly varying copies and bootlegs continue to proliferate today. According to a 1988 bibliography produced with supervision by Leary's original archivist Michael Horowitz, *Mind Mirror* was initially released in 1986 for MSDOS, Apple, and Commodore-based computers.[4] The program's title screen lists copyright dates for both 1985 and 1986, while Leary's official bibliography lists May 1986 as the date of publication. According to notes in Leary's archive, production on the game began at least as early as 1984, but was initially pursued under a different title.[5]

Today, original floppy disk editions of *Mind Mirror* are joined by contemporary preservation efforts, copies and reproductions. These new additions to the *Mind Mirror* genealogy introduce further variation between editions, including new paratextual elements such as text files and drivers. The rest of this section will provide an overview of several such variations, introducing the techniques used to assess them, and briefly considering their historical significance. Each variant of the title can be considered a separate edition, analogous to the various editions of a literary work often addressed in textual scholarship.[6] Under this framework, the original edition of *Mind Mirror* would be identified as the 5.25-inch floppy disk-based editions produced for Apple, Commodore, and MSDOS home computers circa 1986. Each of these ports, which carry subtle variations related to their respective operating environments, are akin to a literary translation.

Just as literary translations must adapt idiomatic expressions and poetic techniques into new linguistic paradigms, multi-platform ports of a software title must adapt it within the frameworks of computation, audio, video, and interaction dictated by a given platform. Emulated copies, which use disk image files and emulated hardware to render *Mind Mirror* accessible in contemporary environments, constitute additional editions of the program, akin to facsimiles and annotated editions of a written text. Finally, Clara Fernandez-Vara and Nick Montfort have made a compelling case for considering external documentation as its own "edition" of a software work, comparable to a volume of annotations or critical treatments.[7] While an exhaustive treatment of all existing editions of *Mind Mirror* is beyond the scope of this report, examples of each will be briefly considered below.

Original hardware and software

Playing *Mind Mirror* on an original commercial floppy disk requires setting up an appropriate combination of computing, display, control, and disk drive hardware. Physical deterioration and rising collectible value make procuring such hardware challenging in many contexts, but several

meaningful software characteristics are displayed more prominently during original hardware use than in other settings. One reason for these differences is related to processing speeds. Events which unfold slowly on original hardware may occur too quickly to notice when emulated copies of the title are executed on contemporary hardware. In the context of *Mind Mirror*, several text-laden splash animations can be seen when booting the disk up on original hardware, yet they often require special adjustments to become intelligible on contemporary computers. Sounds are also more consistent and prominent on original hardware, since contemporary emulators do not necessarily include the necessary audio drivers, and many academic institutions provide access to emulated copies only in quiet spaces designed for intensive research.

Program traits related to the physicality of disk-based storage media become especially apparent in an original hardware context as well. Taking the Commodore 64 edition of *Mind Mirror* as an example, users quickly notice that the program is shipped on two different floppy disks-- one labeled "Program Disk", and another labeled "Life Simulation Disk". Players are required to manually remove one disk and insert another when transitioning between personality-classification routines (the "Program Disk") and role-playing segments ("Life Simulations"). Attempts to make backup copies of the *Mind Mirror* disks also reveal functions unique to the original Commodore hardware-- the copy protection routine included on commercial copies of the game can cause erratic skipping of the disk drive's read/write head when attempting to access unauthorized copies. This skipping can produce an audible banging sound in the disk drive, and can even damage the drive itself in certain circumstances.

Emulation

As alluded to above, emulated copies of *Mind Mirror* may differ substantially from original hardware editions in terms of their speed, audio, video, and disk performance. DOSbox emulator is one of the most popular methods for providing emulated access to programs like *Mind Mirror* (particularly the MSDOS/IBM-Compatible edition); however, frame rates in DOSbox vary widely depending on the speed of a user's hardware. Slowing down performance in DOSbox requires the user to edit a configuration file, which is not possible in many settings, including the Internet Archive's web-based DOSbox port and many other preservation institutions' public access terminals.[8] In many cases, emulated copies of a software title like *Mind Mirror* also arrive augmented with new additions, including "cracks" to disable copy-protection, and various types of after-market documentation. These ancillary features will be discussed with greater detail in the following section.

Documentation, paratexts and epitexts

New copies of *Mind Mirror* are frequently distributed alongside new forms of supporting documentation. The DOSbox and Internet Archive resources cited above are two examples of such documentation, but additional forms may also arrive affixed to, or inserted within, the

files themselves. Many scholars today note that documentation of gameplay via instruction manuals and similar documents can help make up for a lack of access to original materials.[9] Additionally, many scholars follow literary theorist Gerard Genette in understanding these documentation sources in terms of *paratexts*, or texts surrounding a text.[10] For the purposes of this report, one might also differentiate between documentation via *para*texts, which closely surround a primary text, and *epi*texts, which Genette notes are "not materially appended" to a text, and "circulate freely" around it instead.[11]

MyAbandonWare, a website providing ROM files for many unsupported and discontinued software titles, currently provides both MSDOS and Commodore-compatible copies of *Mind Mirror*, both of which are distributed alongside aftermarket paratextual documentation. The DOS edition of *Mind Mirror* provided by MyAbandonWare contains a file named MMIRROR.COM, which has been altered to display the message "Dos driver by Mok <mokmok@usa.net>" when opened with a hex editor.[12] While it is not immediately clear what the driver in reference might be used for, domain registration records pertaining to the @usa.net e-mail address listed in this message suggest that it could not have been inserted prior to 1998, and therefore would not be present in original mid-1980s copies of the program.
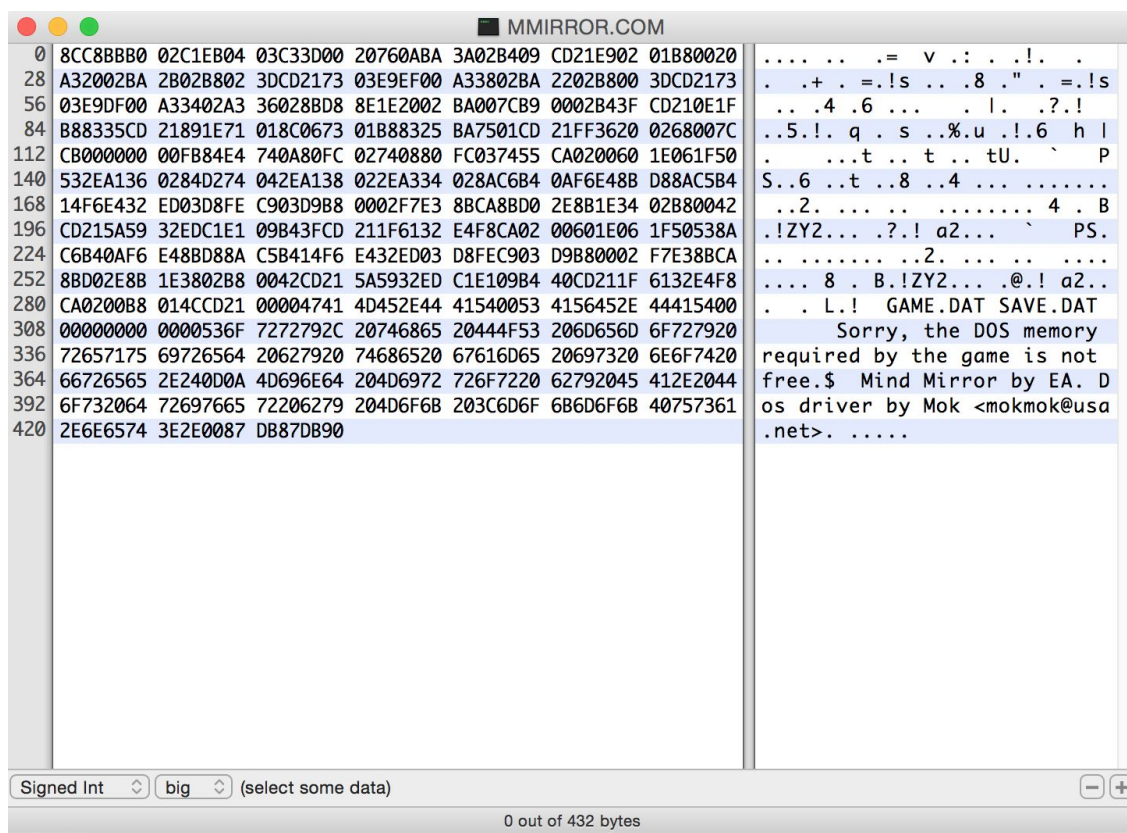

Figure 1: *Mind Mirror* executable file MMIRROR.COM, provided by MyAbandonWare (MSDOS/IBM-comptaibleedition) as readable when opened using Hex Fiend, a free hex editor for Mac OSX.

The Commodore-compatible edition of *Mind Mirror* provided by MyAbandonWare also contains unique paratextual elements. Opening the included VERSION.NFO text file, users may find a selection of bibliographic information about the program, much of which is either incorrect or misleading, suggesting that it was not included with original editions of the program. For example, the file contains a comment reading "Designed by THE Timothy Leary (The 'High Priest' of LSD who died on the net in 1996)", which is not technically true--Leary died offline in his home in 1996, though he did publicly consider live-streaming his own suicide prior to dying.[13] The file also lists *Mind Mirror* as containing 3 disks, which is misleading because the original Commodore-compatible edition actually shipped with 2 disks, though the included "Life Simulations" disk is two-sided, meaning that contemporary disk images of the program may require three separate files all the same.

The Commodore disk images provided by MyAbandonWare also contain paratextual elements that seem to have been present in original copies. Opening the included MINDMIR0.D64 file in a hex editor, users may find a string of text which reads "PIRATEBUSTERS BOOT VERSION 2.0 PROGRAMMED BY KRIS HATLELID AND KEVIN PICKELL WITH TSDS, THE ASSEMBLER OF KINGS!", likely an attribution for the copy-protection routines noted in the "Original hardware and software" section above. This paratextual attribution, along with the disk malfunctions observed when executing backup copies of the title on original hardware (discussed earlier), suggests that understanding *Mind Mirror*'s copy-protection technology requires a look beyond the paratexts attached to contemporary disk images, and out toward more distantly circulated epitexts. Thorough analysis of epitextual documentation concerning copy-protection and game cracking is beyond the scope of this report, but the examples of software documentation discussed in this section should provide a sufficient introduction to the techniques of analysis and background knowledge required for understanding variation between editions of *Mind Mirror* as examples of phenomena likely to be seen in other historical software titles as well.

Ports and translations

In the sections above, this report endeavored to outline the links between multiple electronic editions of the *Mind Mirror* software program. Before concluding, the report will briefly consider *Mind Mirror* from an expanded historical viewpoint, linking all electronic editions to previous text-based works. From this perspective, all editions of *Mind Mirror* may be understood as digital ports, or translations, of Leary's previous intellectual output. Leary's academic career began with a 1950 PhD dissertation at UC Berkeley entitled *The Social Dimensions of Personality: Group Process and Structure*, which was subsequently adapted into his 1957 monograph *Interpersonal Diagnosis of Personality: A functional theory and methodology for personality evaluation.* The *Interpersonal Diagnosis of Personality* book contains a circular chart on which eight personality types can be identified, along with several sub-traits, affinities, and antagonisms for each. Leary termed the chart an "Interpersonal Circumplex," and used it to provide the basis for many subsequent works (including *Mind*

Mirror). The relationship between *Mind Mirror*'s personality scoring charts and Leary's Interpersonal Circumplex can be identified in two ways--visually and textually.

Visual correlation between Leary's Circumplex and his *Mind Mirror* scoring charts becomes apparent when the two are placed side by side. Introducing textual documentation into the mix makes the connection even clearer, as charts included with the original instruction manual can confirm (see figures 2-4, below). Viewed in this context, it is easy to understand the scoring charts as digital adaptations which translate Leary's printed work into the languages of interactive software. Opening game files in a hex editor can confirm the textual side of this relationship. The GAME.DAT file included with MSDOS-compatible editions of *Mind Mirror* conveniently lists all of its personality classification categories in one location, with most mapping clearly onto the categories Leary developed during the 1950s (see figure 5, below).

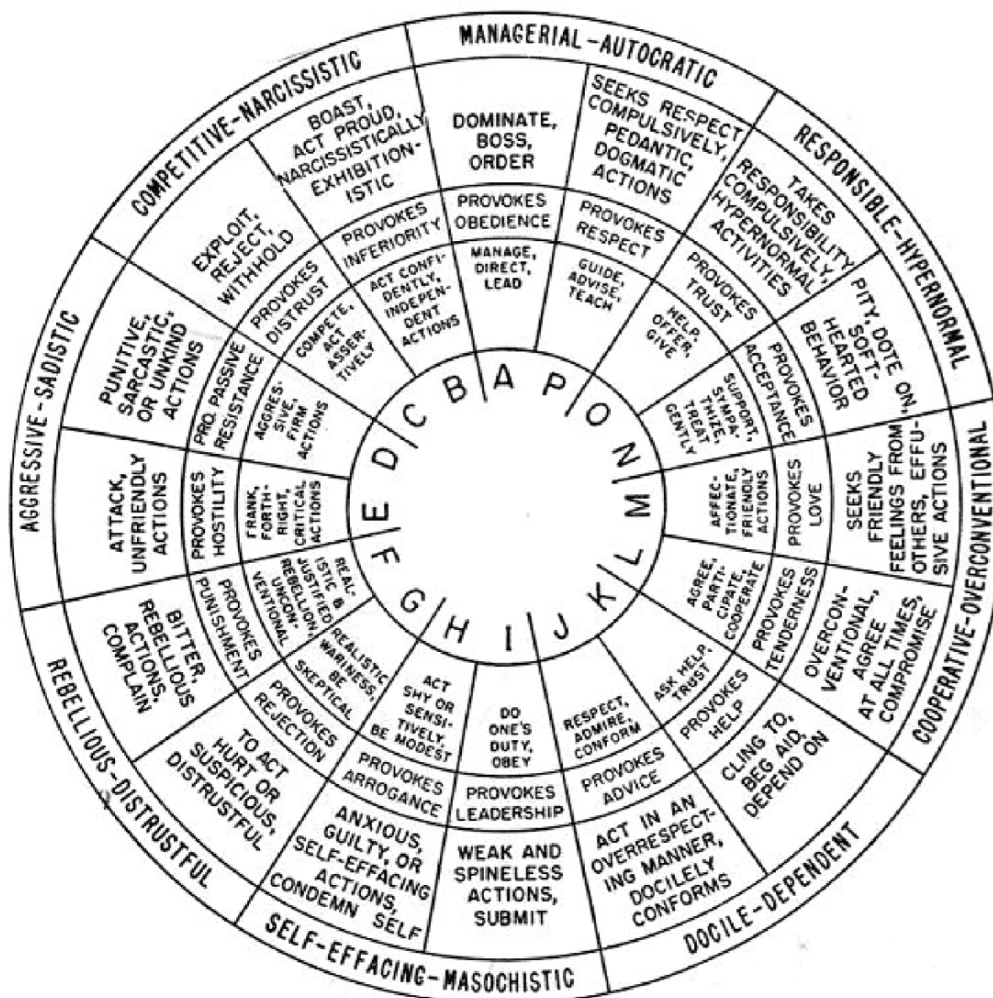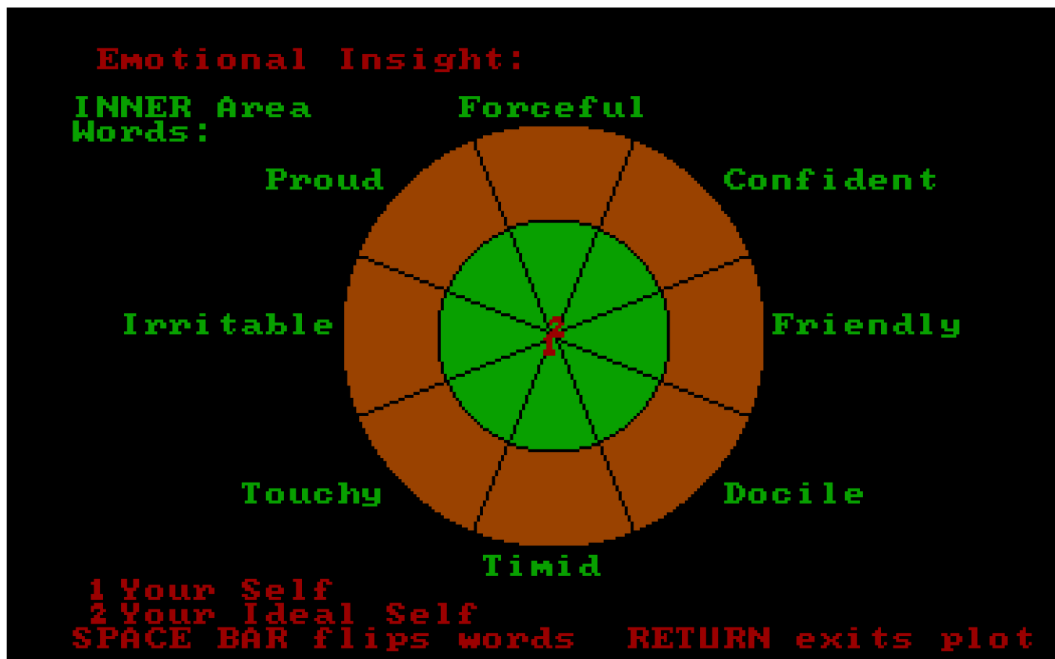
Figure 2: Leary's Interpersonal Circumplex[14]

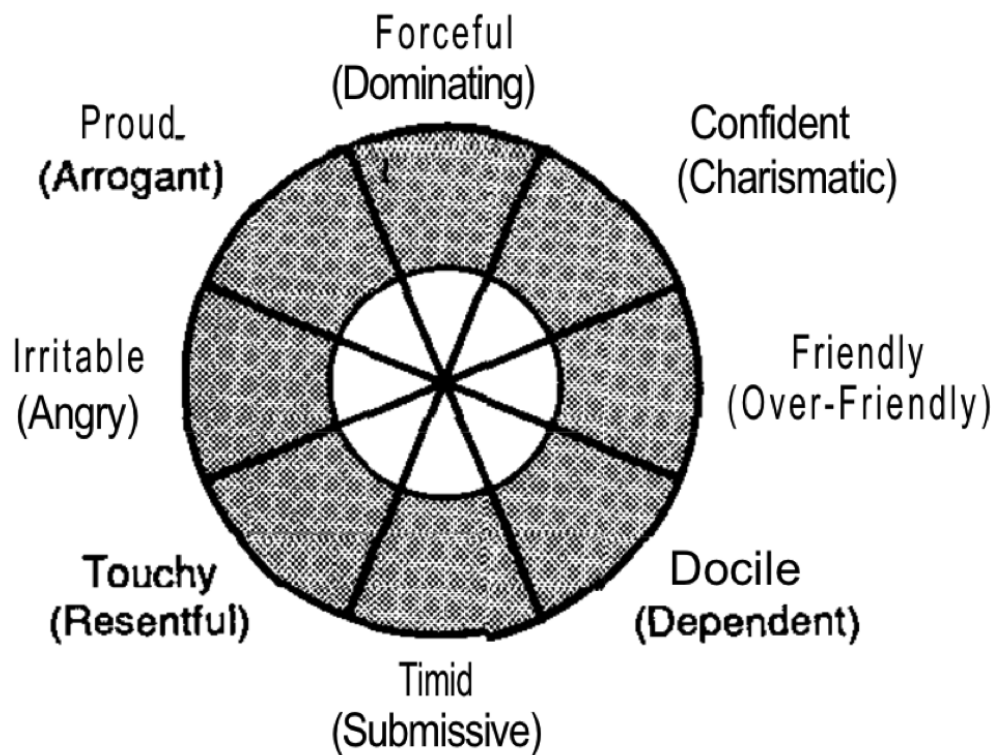**Figure 3**: Scoring chart from *Mind Mirror* (MSDOS edition, emulated via Internet Archive)[15]

Figure 4: *Mind Mirror* scoring chart, as depicted in original instruction manual.[16]

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                              GAME.DAT
135768 0005 0200 0006 0200 0007 0200 0008 0200 0009 0242 696F 2D45              Bio-E
135792 6E65 7267 793A 0045 6D6F 7469 6F6E 616C 2049 6E73 6967 6874  nergy: Emotional Insight
135816 3A00 4D65 6E74 616C 2041 6269 6C69 7469 6573 3A00 536F 6369  : Mental Abilities: Soci
135840 616C 2049 6E74 6572 6163 7469 6F6E 3A00 5B10 6710 7A10 8C10  al Interaction: [ g z .
135864 456E 6572 6765 7469 6300 5769 7265 6400 5265 7374 6C65 7373  Energetic Wired Restless
135888 0044 7269 7665 6E00 5365 7269 6F75 7300 476C 6F6F 6D79 0043   Driven Serious Gloomy C
135912 6175 7469 6F75 7300 576F 7272 6965 6400 4361 6C6D 004C 6574  autious Worried Calm Let
135936 6861 7267 6963 0045 6173 792D 476F 696E 6700 4C61 7A79 0043  hargic Easy-Going Lazy C
135960 6865 6572 6675 6C00 5369 6C6C 7900 456E 7468 7573 6961 7374  heerful Silly Enthusiast
135984 6963 0056 6976 6163 696F 7573 0046 6F72 6365 6675 6C00 446F  ic Vivacious Forceful Do
136008 6D69 6E61 7469 6E67 0050 726F 7564 0041 7272 6F67 616E 7400  minating Proud Arrogant
136032 4972 7269 7461 626C 6500 416E 6772 7900 546F 7563 6879 0052  Irritable Angry Touchy R
136056 6573 656E 7466 756C 0054 696D 6964 0053 7562 6D69 7373 6976  esentful Timid Submissiv
136080 6500 446F 6369 6C65 0044 6570 656E 6465 6E74 0046 7269 656E  e Docile Dependent Frien
136104 646C 7900 4F76 6572 2D5E 4672 6965 6E64 6C79 0043 6F6E 6669  dly Over-^Friendly Confi
136128 6465 6E74 0043 6861 7269 736D 6174 6963 0057 656C 6C2D 496E  dent Charismatic Well-In
136152 666F 726D 6564 004B 6E6F 772D 4974 2D41 6C6C 0050 7261 6374  formed Know-It-All Pract
136176 6963 616C 0050 6564 616E 7469 6300 436F 6E76 656E 7E2D 5E74  ical Pedantic Conven~-^t
136200 696F 6E61 6C00 556E 696D 6167 696E 617E 2D5E 7469 7665 0053  ional Unimagina~-^tive S
136224 656E 7369 626C 6500 496D 6974 6174 6976 6500 556E 6564 7563  ensible Imitative Uneduc
136248 6174 6564 0049 6C6C 6974 6572 6174 6500 496D 7072 6163 7469  ated Illiterate Impracti
136272 6361 6C00 556E 7265 616C 6973 7469 6300 4372 6561 7469 7665  cal Unrealistic Creative
136296 0044 7265 616D 7900 496E 6E6F 7661 7469 7665 0056 6973 696F   Dreamy Innovative Visio
136320 6E61 7279 0049 6E66 6C75 656E 7469 616C 0053 6E6F 6262 6973  nary Influential Snobbis
136344 6800 5265 7370 6563 7461 626C 6500 5570 7269 6768 7400 4D6F  h Respectable Upright Mo
136368 7261 6C69 7374 6963 0050 7572 6974 616E 7E2D 5E69 6361 6C00  ralistic Puritan~-^ical
136392 556E 736F 7068 6973 7469 7E2D 5E63 6174 6564 004E 6169 7665  Unsophisti~-^cated Naive
136416 004C 6F77 6572 2D43 6C61 7373 0055 6E6B 6E6F 776E 0055 6E63   Lower-Class Unknown Unc
136440 756C 7475 7265 6400 5769 6C64 0055 6E69 6E7E 2D5E 6869 6269  ultured Wild Unin~-^hibi
136464 7465 6400 4E6F 6E7E 2D5E 636F 6E66 6F72 6D69 7374 0057 6F72  ted Non~-^conformist Wor
136488 6C64 6C79 0055 6C74 7261 2D53 6F70 6869 737E 2D5E 7469 6361  ldly Ultra-Sophis~-^tica
136512 7465 6400 A810 B810 C810 D710 E810 F710 0711 1611 B210 C110  ted . . . . . .     . .
136536 D010 E010 ED10 0211 1011 2311 2D11 4111 5011 6011 7111 8211  . . .      # - A P ` q .
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Signed Int ⌄   big ⌄ (select some data)   ⊖ ⊕
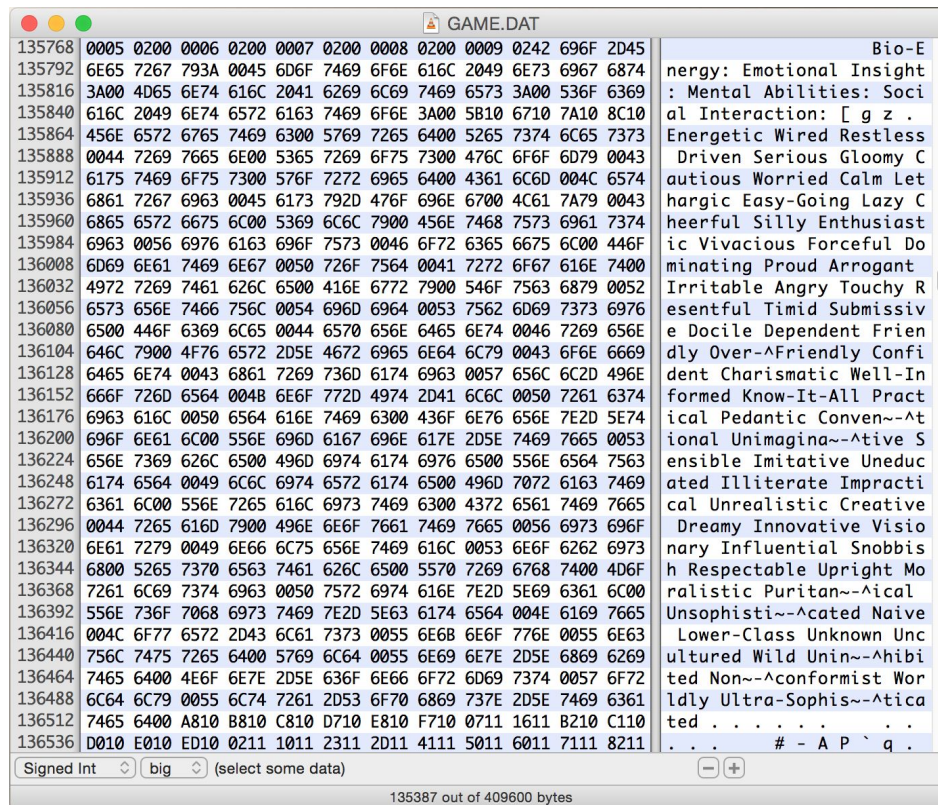
135387 out of 409600 bytes

Figure 5: Hex readout of GAME.DAT, MSDOS edition of *Mind Mirror*. Note personality traits in right column, correlated with categories listed in figures 2-4.

Conclusion

Mind Mirror is a strange piece of software, combining text-based role-playing with psychological self-help. It is frequently preserved by cultural institutions because of its connection to Leary's academic research, 20th-century countercultures, and early computer industries. Still, it defies easy interpretation. This report has attempted to provide users with an introduction to the cultural, historical and technical knowledge needed to begin understanding an esoteric software artifact. The contents of this report will certainly assist any user who wishes to understand *Mind Mirror* in all of its considerable multi-edition variability, but they may also be of use to individuals who aim to examine other perplexing software programs. Using a combination of original hardware, emulators, hex editors, internal paratexts and supporting documentation, users may find that relationships between original and reproduced editions, as well as ports and translations, become much clearer. Once a relation between editions has been established, users may more effectively navigate idiosyncrasies such as disk swapping, copy protection, audio/video disturbances, and speed variation, thus understanding the content of a program more deeply than before.

References

1 See http://www.timothylearyarchives.org/mind-mirror/

2 See https://www.erowid.org/culture/characters/leary_timothy/leary_timothy_remembrance1.shtml and
https://joi.ito.com/weblog/2006/05/31/10-years-since.html

3 Leary, T. (December 1985) *Mind Mirror* marketing notes. Timothy Leary papers, New York Public Library Rare Books and Manuscripts Division. New York, NY. MssCol 18400, box 217, folder 12.

4 Horowitz, M., Walls, K, and Smith, B. (1988) *An Annotated bibliography of Timothy Leary.* Hamden, CT: Archon Books, p. 83.

5 Leary, T. (September 1984) Memo of agreement concerning script development for "Mind Adventure". Timothy Leary papers, New York Public Library Rare Books and Manuscripts Division. New York, NY. MssCol 18400, box 240, folder 4.

6 Fernández-Vara, C. and Montfort, N. (2013) Videogame Editions for Play and Study. Trope Tank Technical Report. Available from http://trope-tank.mit.edu
See also: Young, C.J. (in press) The Collation Game: Identifying the Bibliographical Variants Between The Last of Us and The Last of Us Remastered. *The Papers of the Bibliographical Society of America.*

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8 See support documents at
https://www.dosbox.com/wiki/Performance#CPU_Cycles_.28speed_up.2Fslow_down.29 and
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9 See Guins, R. (2014) *Game After*. Cambridge, MA: MIT Press.
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11 Genette, G. (1997[1987]). *Paratexts: Thresholds of interpretation*. Cambridge: Cambridge University Press, p. 344

12 For more information about hex editors, see Kirschenbaum, M. (2012) *Mechanisms: New Media and the Forensic Imaginary*. Cambridge, MA: MIT Press, p. 114-127.

13 For more on Leary's death and the rumors a live video stream, see Cornwall, R (May 31, 1996) "Timothy Leary, Sixties messiah, dies with the words 'Why not?'" *The Independent.* Available from
http://www.independent.co.uk/news/timothy-leary-sixties-messiah-dies-with-the-words-why-not-1334822.html
(accessed August 28, 2016).

14   Leary, T. (1957). *Interpersonal Diagnosis of Personality: A functional theory and methodology for personality evaluation*. Ronald Press Company: New York, p. 65.

15 See https://archive.org/details/msdos_Timothy_Learys_Mind_Mirror_1986

16 Timothy Leary's *Mind Mirror* (1986) Electronic Arts. Instruction manual, p. 6. (Note: All editions of *Mind Mirror* shipped with the same instruction manual; differences between editions were addressed via version-specific printed inserts.)

About the Media Archaeology Lab

Founded in 2009 and generously supported by the College of Media, Communication and Information as well as the Department of English at the University of Colorado at Boulder, the motto of the Media Archaeology Lab (MAL) is that "the past must be lived so that the present can be seen." Nearly all digital media labs are conceived of as a place for experimental research using the most up-to-date, cutting-edge tools available. The MAL – which very well might be the largest of its kind in the world – is a place for cross-disciplinary experimental research and teaching using still functioning media from the past. The MAL is propelled equally by the need to both preserve and maintain access to historically important media of all kinds – from magic lanterns, projectors, typewriters to personal computers from the 1970s through the 1990s – as well as early works of digital literature/art which were created on the hardware/software housed in the lab.

The lab is defined as much by what it is not as by what it is. It is a unique humanities lab that is not interested in scientificity. Rather than being hierarchical and classificatory, it is porous, flat, and branching. Objects are organized in any way participants want; everything is functional and made to be turned on. Rather than being an entity you need to apply to be a part of or something you can only participate in as a researcher, librarian, PhD student, anyone may participate in the lab and have a say about what projects we take on, what kinds of work we do. Rather than setting out to adhere to specific outcomes and five year plans, we change from semester to semester and year to year depending on who's spending time in the lab.

The MAL is interested in experiments with temporality, with a disruptive relationship between past, present and future, and with lab infrastructure in general. It is a place for serious play and for playful seriousness. It is an anti-museum museum, in that all of its hundreds of devices, analog and digital, are meant to be turned on and actively played with, opened up, tinkered with, experimented with, created with, and moved around and juxtaposed next to any other device. The MAL acts as a kind of meta-lab for thinking through the infrastructure of labs and how they fundamentally shape and inform what is produced, from games to history, within the confines of the lab structure. The MAL's holdings quietly show how the history of computing is anything but a neat progression of devices simply improving upon and building upon what came before. In other words, the MAL's collection itself is a disruption to a particular notion of temporality underlying another particular notion of "history". With these devices, we can understand the waxing and waning of technologies more in terms of a phylogenetic tree whereby they are altered over time, split into separate branches, hybridized, or are terminated.